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AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

- 1 1. (Currently amended) A method of detecting one of a set of preamble
- 2 sequences in a spread signal comprising the steps of:
- 3 (a) correlating the received spread signal with sequences of a first orthogonal Gold
- 4 code (OGC) set in accordance with a first fast transform to provide a preamble signal;
- 5 (b) correlating the preamble signal with the set of preamble sequences in
- 6 accordance with a second fast transform to generate a set of index values;
- 7 (c) forming a decision statistic based on the set of index values; and
- 8 (d) selecting, as the detected one of the set of preamble sequences, a preamble
- 9 sequence corresponding to the decision statistic;
- 10 wherein step (c) comprises the steps of:
- 11 1) forming an initial decision statistic based on the relative maximum index of the
- 12 set of index values;
- 13 2) selecting the signal generated by the preamble sequence combined with the
- 14 preamble signal corresponding to the initial decision statistic;
- 15 3) adjusting, in one or more of amplitude and phase, the signal selected in step 2);
- 16 and
- 17 4) forming the decision statistic based on the adjusted signal.

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1 2. (Original) The invention as recited in claim 1, wherein, for step (a), the
2 first fast transform method is a fast orthogonal Gold code transform (FOGT) comprising
3 the steps of

4 1) multiplying the received spread signal with a first sequence vector and a
5 forward permutation vector to generate a permuted sequence signal, wherein:

6 the first OGC set is generated from the first sequence vector and a cyclic
7 shift matrix of a second sequence vector, and the forward permutation vector
8 maps between i) the cyclic shift matrix and ii) a matrix of Walsh-Hadamard
9 sequences; and

10 2) applying the fast Hadamard transform to the permuted sequence signal to
11 generate a set of correlated signals, the preamble signal selected as one of the set of
12 correlated signals based on a predetermined decision criterion.

1 3. (Original) The invention as recited in claim 1, wherein:

2 for step (b), the set of preamble sequences are selected from a second OGC set
3 formed from first and second sequence vectors, the second OGC set generated from the
4 first sequence vector and a cyclic shift matrix of a second sequence vector; and wherein

5 the second fast transform is a fast orthogonal Gold code transform (FOGT)
6 comprising the steps of

7 1) multiplying the preamble signal with a first sequence vector and a
8 forward permutation vector to generate a permuted preamble signal, the forward
9 permutation vector mapping between i) the cyclic shift matrix and ii) a matrix of
10 Walsh-Hadamard sequences, and

11 2) applying the fast Hadamard transform to the permuted preamble signal
12 to generate the set of index values.

1 4. (Original) The invention as recited in claim 1, wherein, for step (b), the set
2 of preamble sequences are selected from set of Walsh-Hadamard sequences, and the
3 second fast transform is a fast Hadamard transform.

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1 5. (Original) The invention as recited in claim 1, wherein, for step (a), the
2 received spread signal is a burst of a random-access channel in a code-division, multiple-
3 access communication system.

1 6. (Cancelled)

1 7. (Currently amended) The invention as recited in claim 6 1, wherein step
2 (c3) adjusts the selected signal by estimating a channel response from the preamble
3 signal, forming a de-rotation signal from the preamble signal, and combining the de-
4 rotation signal with the preamble signal for coherent sequence detection.

1 8. (Currently amended) The invention as recited in claim 6 1, wherein step
2 (c2) employs the initial decision statistic to locally generate a corresponding preamble
3 sequence, the locally generated preamble sequence being combined with the preamble
4 signal f

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5 9. (Currently amended) A method of detecting one of a set of preamble
6 sequences in a spread signal comprising the steps of:

7 (a) correlating the received spread signal with a set of orthogonal sequences to
8 provide a preamble signal;

9 (b) correlating the preamble signal with one or more preamble sequences of an
10 orthogonal Gold code (OGC) set in accordance with a fast transform to generate a set of
11 index values;

12 (c) forming a decision statistic based on the set of index values; and

13 (d) selecting, as the detected one of the set of preamble sequences, a preamble
14 sequence corresponding to the decision statistic;

15 wherein step (c) comprises the steps of:

16 1) forming an initial decision statistic based on the relative maximum index of the
17 set of index values;

18 2) selecting the signal generated by the preamble sequence combined with the
19 preamble signal corresponding to the initial decision statistic;

20 3) adjusting, in one or more of amplitude and phase, the signal selected in step 2);

21 and

22 4) forming the decision statistic based on the adjusted signal.

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- 1 10. (Original) The invention as recited in claim 9, wherein:
- 2 for step (b), each preamble sequence is selected from the OGC set formed from
- 3 first and second sequence vectors, wherein the OGC set is generated from the first
- 4 sequence vector and a cyclic shift matrix of a second sequence vector; and wherein
- 5 the fast transform is a fast orthogonal Gold code transform (FOGT) comprising
- 6 the steps of
- 7 1) multiplying the preamble signal with a first sequence vector and a forward
- 8 permutation vector to generate a permuted preamble signal, the forward permutation
- 9 vector mapping between i) the cyclic shift matrix and ii) a matrix of Walsh-Hadamard
- 10 sequences; and
- 11 2) applying the fast Hadamard transform to the permuted preamble signal to
- 12 generate the set of index values.

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1 11. (Currently amended) A preamble detector for detecting one of a set of
2 preamble sequences in a spread signal, the preamble detector comprising:

3 a first correlator correlating the received spread signal with sequences of a first
4 orthogonal Gold code (OGC) set in accordance with a first fast transform to provide a
5 preamble signal;

6 a second correlator correlating the preamble signal with the set of preamble
7 sequences in accordance with a second fast transform method to generate a set of index
8 values;

9 a circuit forming a decision statistic based on the set of index values; and

10 a selector selecting, as the detected one of the set of preamble sequences, a
11 preamble sequence corresponding to the decision statistic;

12 wherein the circuit forming the decision statistic comprises:

13 a first magnitude detector forming an initial decision statistic based on the relative
14 maximum index of the set of index values;

15 a signal selector selecting the signal generated by the preamble sequence
16 combined with the preamble signal corresponding to the initial decision statistic;

17 a coherent detector adjusting, in one or more of amplitude and phase, the signal
18 selected in step 2); and

19 a second magnitude detector forming the decision statistic based on the adjusted
20 signal.

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1 12. (Original) The invention as recited in claim 11, wherein the first fast
2 transform is a fast orthogonal Gold code transform (FOGT), the first OGC set is
3 generated from a first sequence vector and a cyclic shift matrix of a second sequence
4 vector, and the forward permutation vector maps between i) the cyclic shift matrix and ii)
5 a matrix of Walsh-Hadamaard sequences; and wherein:

6 the first correlator comprises:

7 a multiplier multiplying the received spread signal with the first sequence
8 vector and a forward permutation vector to generate a permuted sequence signal;
9 and

10 a combiner applying the fast Hadamaard transform to the permuted
11 sequence signal to generate a set of correlated signals, the preamble signal
12 selected as one of the set of correlated signals based on a predetermined decision
13 criterion.

1 13. (Original) The invention as recited in claim 11, wherein:

2 the set of preamble sequences is selected from a second OGC set formed from
3 first and second sequence vectors, the second OGC set generated from the first sequence
4 vector and a cyclic shift matrix of a second sequence vector; and the second fast
5 transform is a fast orthogonal Gold code transform (FOGT); and wherein:

6 the second correlator comprises:

7 a multiplier multiplying the preamble signal with a first sequence vector
8 and a forward permutation vector to generate a permuted preamble signal, the
9 forward permutation vector mapping between i) the cyclic shift matrix and ii) a
10 matrix of Walsh-Hadamaard sequences, and

11 a combiner applying the fast Hadamaard transform to the permuted
12 preamble signal to generate the set of index values.

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1 14. (Original) The invention as recited in claim 11, wherein the set of
2 preamble sequences is selected from a set of Walsh-Hadamaard sequences, and the
3 second fast transform is a fast Hadamaard transform.

1 15. (Original) The invention as recited in claim 11, wherein the received
2 spread signal is a burst of a random-access channel in a code-division, multiple-access
3 communication system.

1 16. (Cancelled)

1 17. (Currently amended) The invention as recited in claim ~~16~~ 11, wherein the
2 coherent detector includes a channel estimator for i) estimating a channel response from
3 the preamble signal, and ii) forming a de-rotation signal from the preamble signal, and a
4 combiner for combining the de-rotation signal with the preamble signal for coherent
5 sequence detection.

1 18. (Currently amended) The invention as recited in claim ~~16~~ 11, wherein the
2 coherent detector includes a sequence generator, the sequence generator employing the
3 initial decision statistic to locally generate a corresponding preamble sequence; and a
4 combiner combining the locally generated preamble sequence with the preamble signal
5 for coherent sequence detection.

1 19. (Original) The invention as recited in claim 11, wherein the preamble
2 detector is embodied in an integrated circuit.

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1 20. (Currently amended) A preamble detector for detecting one of a set of
2 preamble sequences in a spread signal comprising ~~the steps of~~:

3 a first correlator correlating the received spread signal with a set of orthogonal
4 sequences to provide a preamble signal;

5 a second correlator correlating the preamble signal with one or more preamble
6 sequences of an orthogonal Gold code (OGC) set in accordance with a fast transform to
7 generate a set of index values;

8 a circuit forming a decision statistic based on the set of index values; and

9 a selector selecting, as the detected one of the set of preamble sequences, a
10 preamble sequence corresponding to the decision statistic;

11 wherein the circuit forming the decision statistic comprises:

12 a first magnitude detector forming an initial decision statistic based on the relative
13 maximum index of the set of index values;

14 a signal selector selecting the signal generated by the preamble sequence
15 combined with the preamble signal corresponding to the initial decision statistic;

16 a coherent detector adjusting, in one or more of amplitude and phase, the signal
17 selected in step 2); and

18 a second magnitude detector forming the decision statistic based on the adjusted
19 signal.

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1 21. (Original) The invention as recited in claim 20, wherein:
2 each preamble sequence is selected from the OGC set formed from first and
3 second sequence vectors, wherein the OGC set is generated from the first sequence vector
4 and a cyclic shift matrix of a second sequence vector and the fast transform is a fast
5 orthogonal Gold code transform (FOGT); and wherein
6 the second correlator comprises:
7 a multiplier multiplying the preamble signal with a first sequence vector and a
8 forward permutation vector to generate a permuted preamble signal, the forward
9 permutation vector mapping between i) the cyclic shift matrix and ii) a matrix of Walsh-
10 Hadamard sequences; and
11 a combiner applying the fast Hadamard transform to the permuted preamble
12 signal to generate the set of index values.

1 22. (Original) The invention as recited in claim 20, wherein the preamble
2 detector is embodied in an integrated circuit.

23-29. (Cancelled)